CLAIMS

What is claimed is:

1. A method of manufacturing a photoreceptor includes the steps of:

providing a substrate to be coated with a charge transfer layer ("CTL");

providing a tube having an upper opening sized to receive the substrate therethrough and configured to act as a solution outlet and a inlet lower than the CTL outlet;

providing a motor driven pump for circulating CTL solution through the tube by forcing the CTL solution through the lower inlet;

filling the tube with CTL solution;

circulating the CTL solution using the motor driven pump;

dipping the substrate in the tube;

withdrawing the substrate from the tube;

measuring the viscosity of the CTL solution and altering the pump motor angular velocity to control the thickness of the CTL solution deposited on the substrate.

2. The method of claim 1 wherein the measuring step is performed during the withdrawing step.

3. The method of claim 1 wherein the altering the pump motor angular velocity step is performed during the withdrawing step.

4. The method of claim 3 wherein the measuring step is performed during the withdrawing step.

5. The method of claim 4 wherein the substrate is a drum.

6. The method of claim 1 wherein the circulating step induces the CTL to have a vertical flow rate and the withdrawing step is performed at a pull rate, and the pull rate is less than the vertical flow rate.

7. A method of controlling the thickness of a coating layer on a coated article manufactured using an immersion or dip coating process utilizing a dip tank through which a coating solution is pumped at an initial flow rate by a motor driven pump includes:

dipping the article in the dip tank;

sensing the viscosity of the coating solution;

withdrawing the article from the dip tank at a pull rate, said pull rate and said flow rate exhibiting a differential rate;

adjusting the differential rate by altering the flow rate of the coating solution in response to the sensed viscosity.

8. The method of claim 7 wherein the flow rate is altered by adjusting the angular velocity of the motor.

9. The method of claim 7 and further comprising the steps of establishing a viscosity setpoint, establishing a motor speed nominal velocity to generate the initial flow rate.

10. The method of claim 9 wherein the flow rate is adjusted from the initial flow rate when the sensed viscosity differs from the setpoint viscosity by a predetermined amount.

11. The method of claim 10 wherein the predetermined amount is between 5 to 30 centipoise.

12. The method of claim 10 wherein the predetermined amount is between about 15 and about 25 centipoise.

13. The method of claim 10 and further comprising the steps of repeating the sensing of the viscosity step after the adjusting the flow rate from the initial flow rate step and returning the flow rate to the initial flow rate in response to the sensed viscosity when the differential between sensed viscosity and the setpoint viscosity is within a second predetermined amount.

14. The method of claim 13 wherein the second predetermined amount is substantially less than the first predetermined amount.

15. The method of claim 14 wherein the second predetermined amount is not more than about a half of the first predetermined amount.

16. The method of claim 15 wherein the flow rate is adjusted by adjusting the angular velocity of the motor driving the pump.

17. A dip coating apparatus for immersion coating an article with a coating layer of a solution, the apparatus comprising:

a dip tank configured to receive the article therein, said dip tank including an upper opening sized to permit the article to pass therethrough, a solution outlet, and a solution inlet situated below the solution outlet;

a solution pumping system for pumping solution at a pump rate into the inlet of the dip tank to generate a vertical flow of solution within the dip tank between the inlet and the outlet, the pumping system comprising a motor driven pump fluidly coupled to a source of solution and the inlet of the dip tank;

a controller for adjusting the pump rate whereby adjustments to the pump rate vary the vertical flow rate of the solution;

a viscometer for measuring the viscosity of the solution, the viscometer providing an input to the controller indicative of the measured viscosity of the solution, and

wherein the controller adjusts the pump rate in response to the measured viscosity of the solution.

18. The apparatus of claim 17 wherein the controller controls the angular velocity of the motor.

19. The device of claim 18 and further comprising a plurality of such dip tanks, a manifold fluidly coupled to the pump and the inlets of the plurality of manifolds, a reservoir for capturing solution flowing out of the outlets of the plurality of dip tanks and being fluidly coupled to the pump.

20. The device of claim 19 wherein the viscometer is located in the pumping system disposed between the motor driven pump and the inlet of the dip tank.